

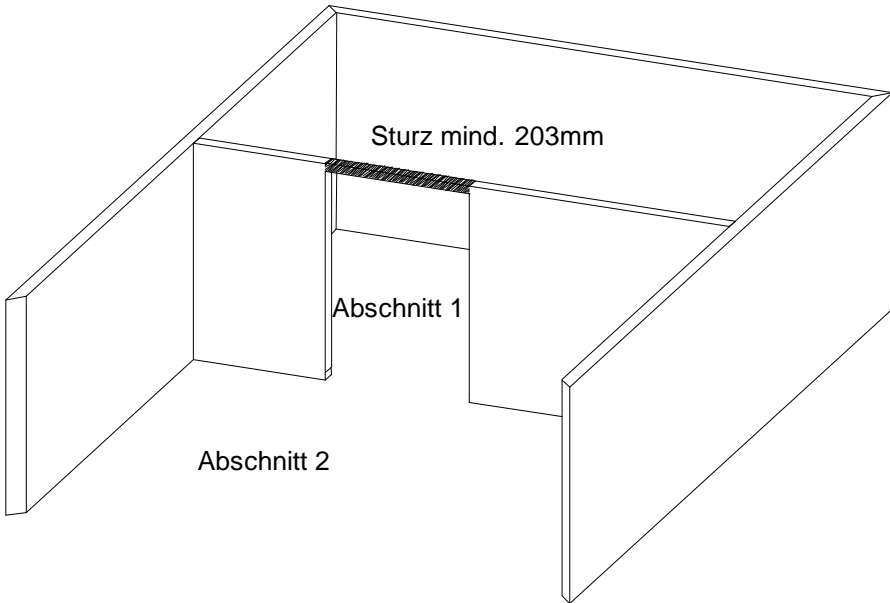
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		SORCE	
B 13	PREVENTIVE FIRE PROTECTION / FIRE FIGHTING		B 01
4 systems for the preventive fire protection and/or fire fighting will be used in the barracks buildings.			B 02
<ol style="list-style-type: none"> 1. Sprinkler systems 2. Extinguishing device kitchen 3. Dry lines acc. to DIN 14461-2 4. Hydrants in exterior facilities 			B 03
B 13.1	Sprinkler Systems		B 04
B 13.1.1	Basis		B 05
Basis for the dimensioning of sprinkler system are the guidelines of National Fire Protection Association NFPA 13 and of NFPA 13R (for apartment buildings with a height of max. 4 floors).		NFPA 13	B 06
Basement and attic do not belong to the occupied floors. See also Fig. 13.1			B 07
Guideline NFPA 13 is applicable for the dimensioning of sprinkler system in the basement as well as in attic.			B 08
The apartment floors will be dimensioned acc. to NFPA 13 R.		NFPA 13R	B 09
The requirements of Military Handbook 1008C of US Ministry of Defense regarding apartment buildings, of Uniform Building Code as well as of NFPA 13R are fulfilled.		MHB 1008C	B 10
The goal is to install a sprinkler system in the facility.			B 11
Fig. 13.1 Sphere of responsibility of standards - floor			B 12
			B 13
			B 14
			B 15

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SORCE		
<p>B 13.1.2 Term Determination</p> <p>Fire Separation Area</p> <p>The fire separation area will be used for determination of quantity of sprinklers effective at the same time in an area.</p> <p>It is defined via an area with complete enclosure of walls as well as ceiling.</p> <p>The fire separation area can have openings to adjacent areas as far as the opening shows a minimum lintel depth of 203 mm from the ceiling and/or below suspended ceilings.</p> <p>The maximum opening size is 4.6 m².</p> <p>The rooms shall have walls with a fire rating of at least 30 minutes between corridor and fire section.</p> <p>The area within the fire separation area is max. 46 m².</p> <p>Fig. 13.1.2 Definition fire separation area</p>  <p>Listed</p> <p>All systems, materials or services, listed in an organization approved by an office with appropriate authority to issue directives.</p> <p>The manufacturer accepts by this list, that the systems, materials or services include the appropriate standards.</p> <p>The term "listed" in case of personnel protective sprinklers means that the systems were tested in Underwriter' Laboratories and the requirements of NFPA 13R of National Fire Protection Association (NFPA), VDS and DVGW are fulfilled.</p> <p>Multipurpose Pipeline System</p> <p>A pipeline system within an apartment which will be used for domestic as well as also for fire protection technical purposes.</p>		B 01
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Personnel Protective Sprinklers	SORCE	B 01
A sprinkler type corresponding to definition of quick responding sprinkler such as defined in NFPA 13 "Standard for Installation of Sprinkler Systems".		B 02
B 13.1.3 Inspection of Sprinkler System	VDS	
A VDS inspection of sprinkler system is not required.		B 03
The sprinkler system shall be either tested by the local Director of Public Works (DPW) or by the European Corps of Engineers (EUD).	DPW EUD	
B 13.1.4 Water Measurement		B 04
An actual water measurement is required for dimensioning of sprinkler system.		
The water measurement shall display as minimum following information:		B 05
1. Water pressure and volume flow at min. 4 operation points		
2. Provision of duct network characteristic line acc. to Hazen-Williams with graphics representation.		
B 13.1.5 Fire Localization		B 06
The release of sprinkler system shall be announced to the fire alarm central station in discipline electrical.		
Flow guards for exact fire localization shall be installed on each floor.		B 07
All valves for blocking of water supply to sprinkler system shall be monitored in opened condition.		
An appropriate detector shall be installed for monitoring and connected to the fire alarm central station of discipline electrical system.		B 08
B 13.1.6 Materials		B 09
Pipe Materials		
Only pipes of galvanized steel are allowed in contrary to NFPA 13.	DIN 2440	
They shall correspond to DIN 2440, as of DN 50 pipes acc. to DIN 2441 shall be used.	DIN 2441	
Pipe connections shall be accomplished acc. to DIN 2999.	DIN 2999	B 10
Sprinkler		
All used sprinklers shall be allowed acc. to NFPA 13 R.		B 11
This requires a test by the Underwriter Laboratories Inc. (UL)	UL	
B 13.1.7 Connection to Water Network		B 12
Multipurpose pipeline systems are acceptable.		
The connections to city water network will be accomplished acc. to following scheme.		B 13
The connection acc. to Fig. 13.3 without intermediate container shall be preferred.		B 14
		B 15

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B 13.1.7.1 Direct Connection without Intermediate Container

Connection acc. to NFPA 13R **without** water meter

Fig. 13.1.7 – 1 Connection to city water network without water meter

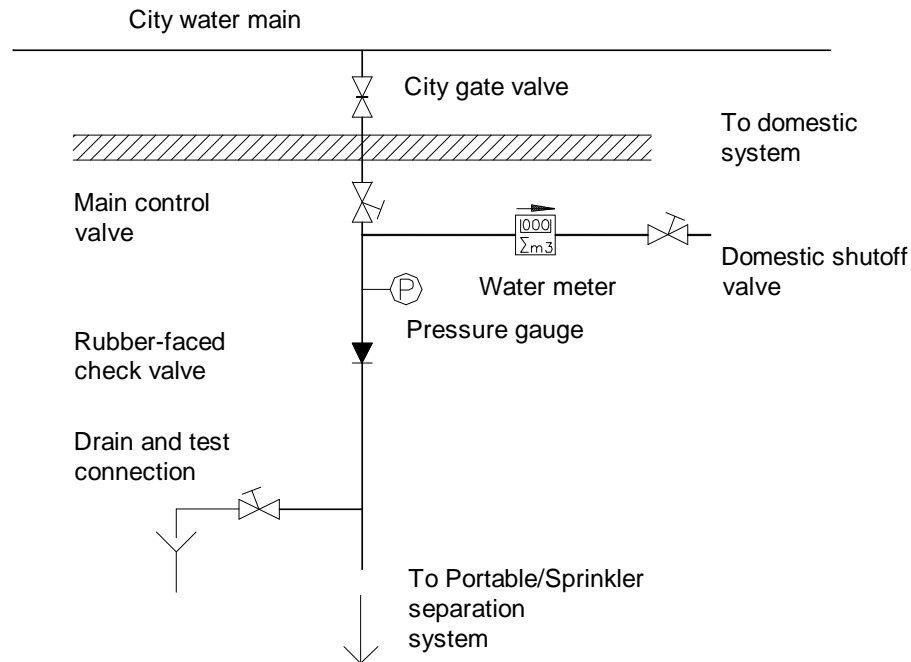
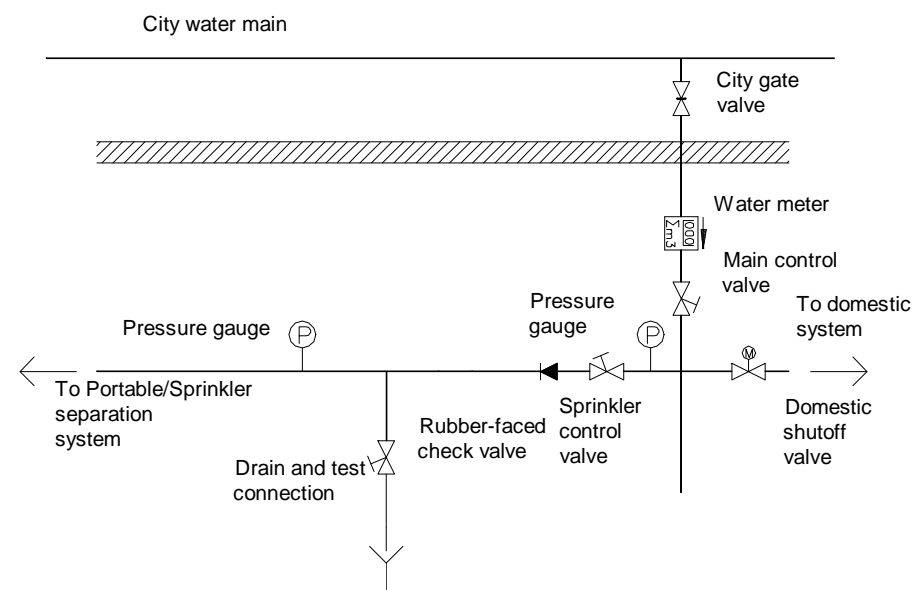


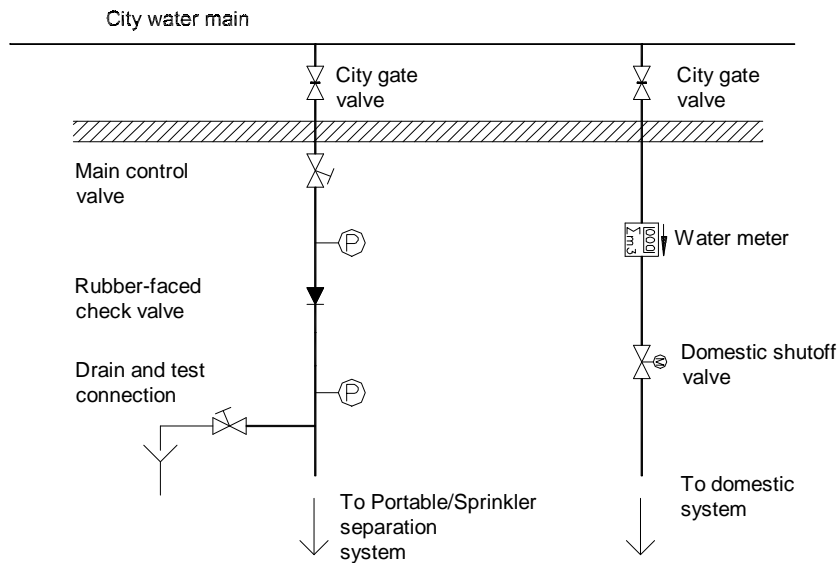
Fig. 13.1.7 – 2 Connection to city water network with water meter



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Fig. 13.1.7 – 3 Connection to city water network with separate lines



A separation station with allowance by VDS shall be used for connection to city water network.

B 13.1.7.2 Connection with Intermediate Container and Pressure Increase System

If the water pressure for supply of hydraulic demanding sprinkler is not sufficient, a pressure increase system with 500 l intermediate container will be used under the condition that the required water volume flow is sufficient.

If the required water volume flow cannot be always guaranteed, an intermediate container acc. to NFPA 13 shall be erected.

The pressure increase system shall correspond to requirements of NFPA 20 and allowed by VDS.

Fig. 13.1.7 - 4 shows a possible system structure.

SORCE

NFPA 13

**NFPA 20
VDS**

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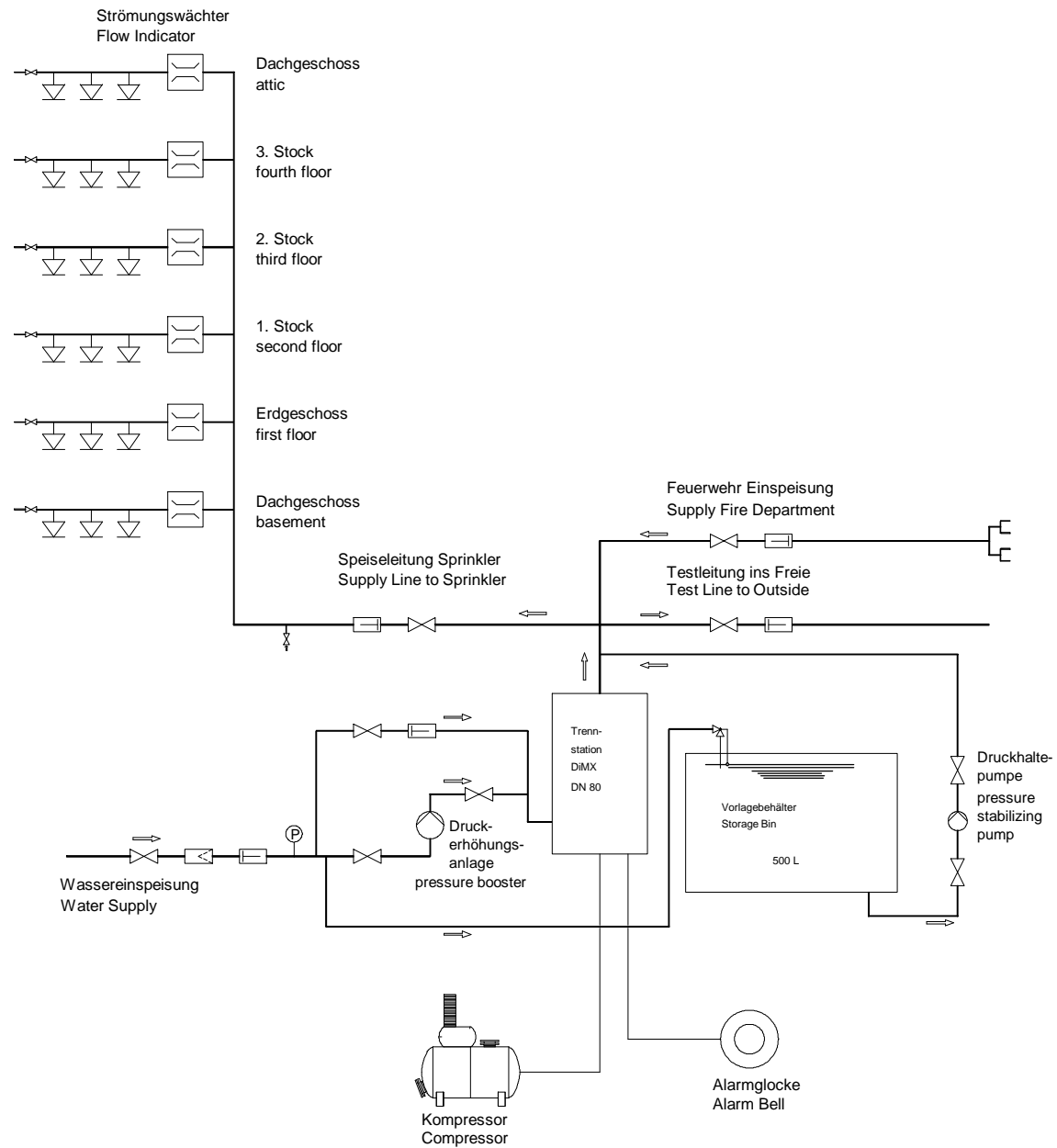
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Fig. 13.1.7 - 4 System scheme sprinkler system



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B 13.1.8 Structure of Separation Station

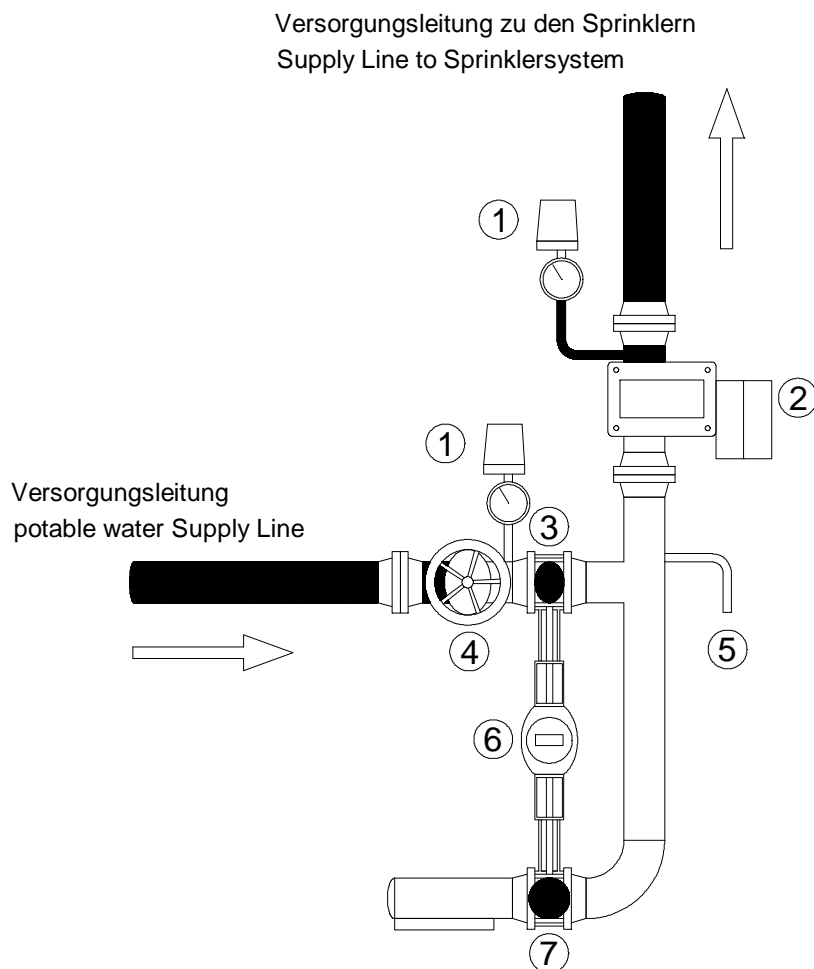
The separation of drinking water line and sprinkler system acc. to DIN 1988 Part 4 can be accomplished with following described separation station.

Function Description:

Operation Standby

Water is standing up to closed shut-off flap no. 3. The shut-off flap no. 4 is opened. The water pressure in sprinkler pipe network shall be maintained by the alarm valve no. 2 effective as check valve. The intermediate located area (2 up to 7) represents the separation between drinking water and non-drinking water.

Fig. 13.1.8 – 1 Separation station in ready position



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DIN 1988

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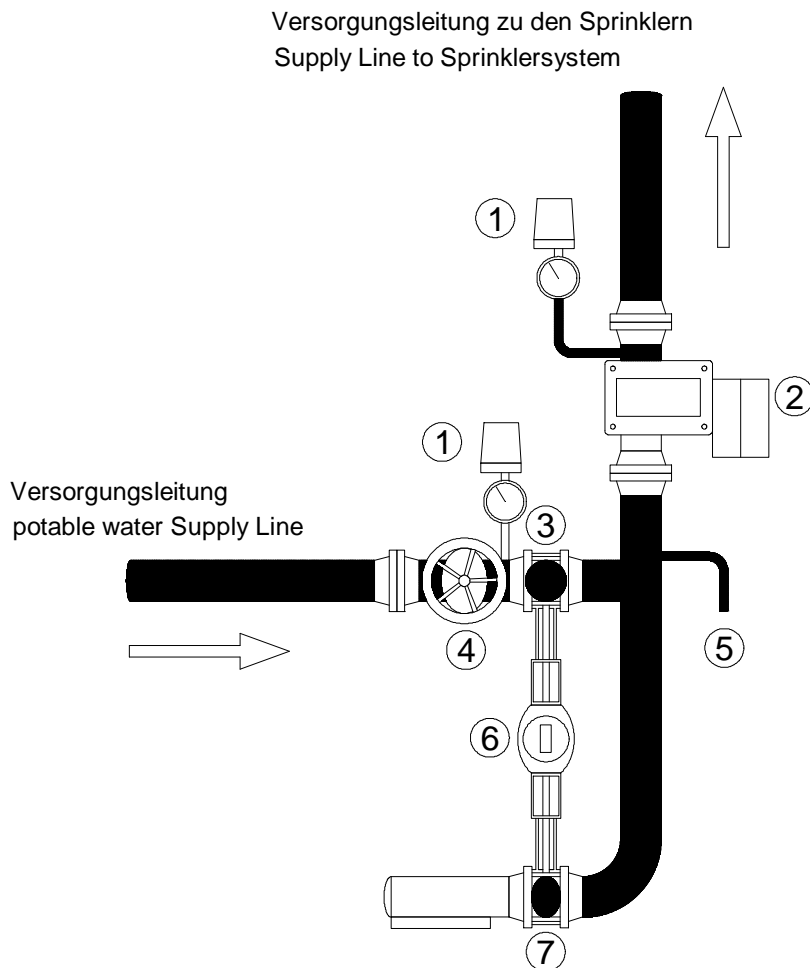
SORCE

Extinguishing Process

The sprinklers activated by the fire heat will open in case of fire. The pressure in sprinkler pipe network will drop and the separation station switches into straight position.

Pressure switch no. 1 recognizes the pressure drop and activates the compressed air operated actuating drive no. 6. The shut-off flap no. 7 closes and shut-off flap no. 3 opens. Now the connection from drinking water pipe network to sprinkler pipe network is provided. An electrical signal from pressure switch no. 1 via the control central station to the Fire Department will be accomplished at the same time. The alarm bell connected to separation area no. 5 will be driven by the water flow and releases a continuous alarm.

Fig. 13.1.8 – 2 Separation station in flow position



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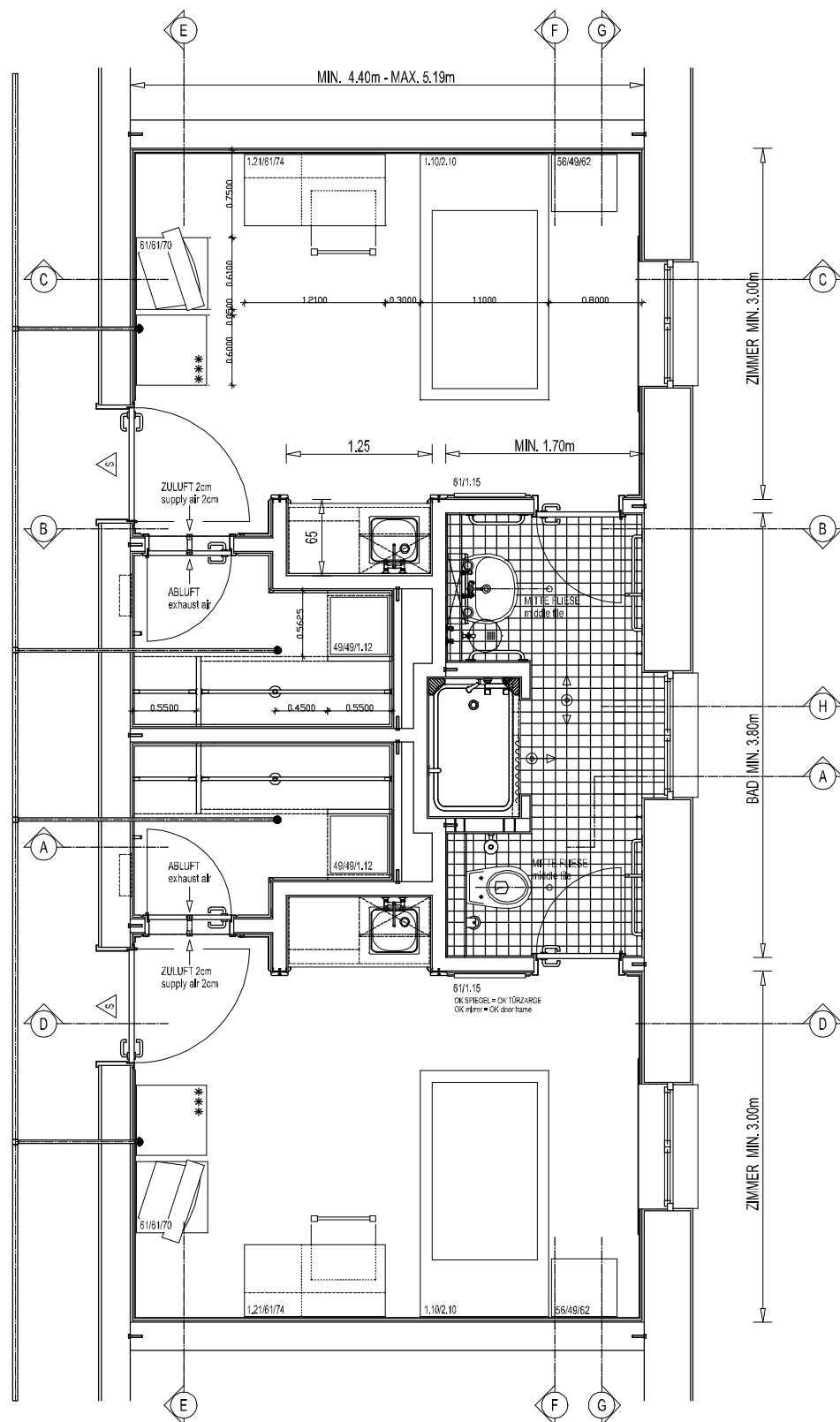
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<p>Switch back into separation position</p> <p>If the water tapping is completed, the separation stations switches back into separation position. The switch back will be accomplished also if the water pressure in supply network drops and is lower than the pressure coming from water column in sprinkler network. Due to this, it is prevented that water of the sprinkler network flows back into the drinking water network.</p> <p>Shut-off flap no. 3 closes by switch back of actuating drive no. 6 and prevents the back flow of extinguishing water into drinking water network. Shut-off flap no. 7 opens at the same time, the water located in separation area will penetrate out of drain connection piece due to this until the entire separation area is free of water.</p> <p>B 13.1.9 Pipe Routing</p> <p>The sprinkler distribution pipes shall be installed orderly in corridor.</p> <p>Pipes shall not be insulated.</p> <p>Fig. 13.1.9-1 up to Fig. 13.1.9-6 show a principle sketch concerning pipe routing.</p>		B 01
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		B 09
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		B 11
		B 12
		B 13
		B 14
		B 15

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Fig. 13.1.9 – 1 Example layout type 1



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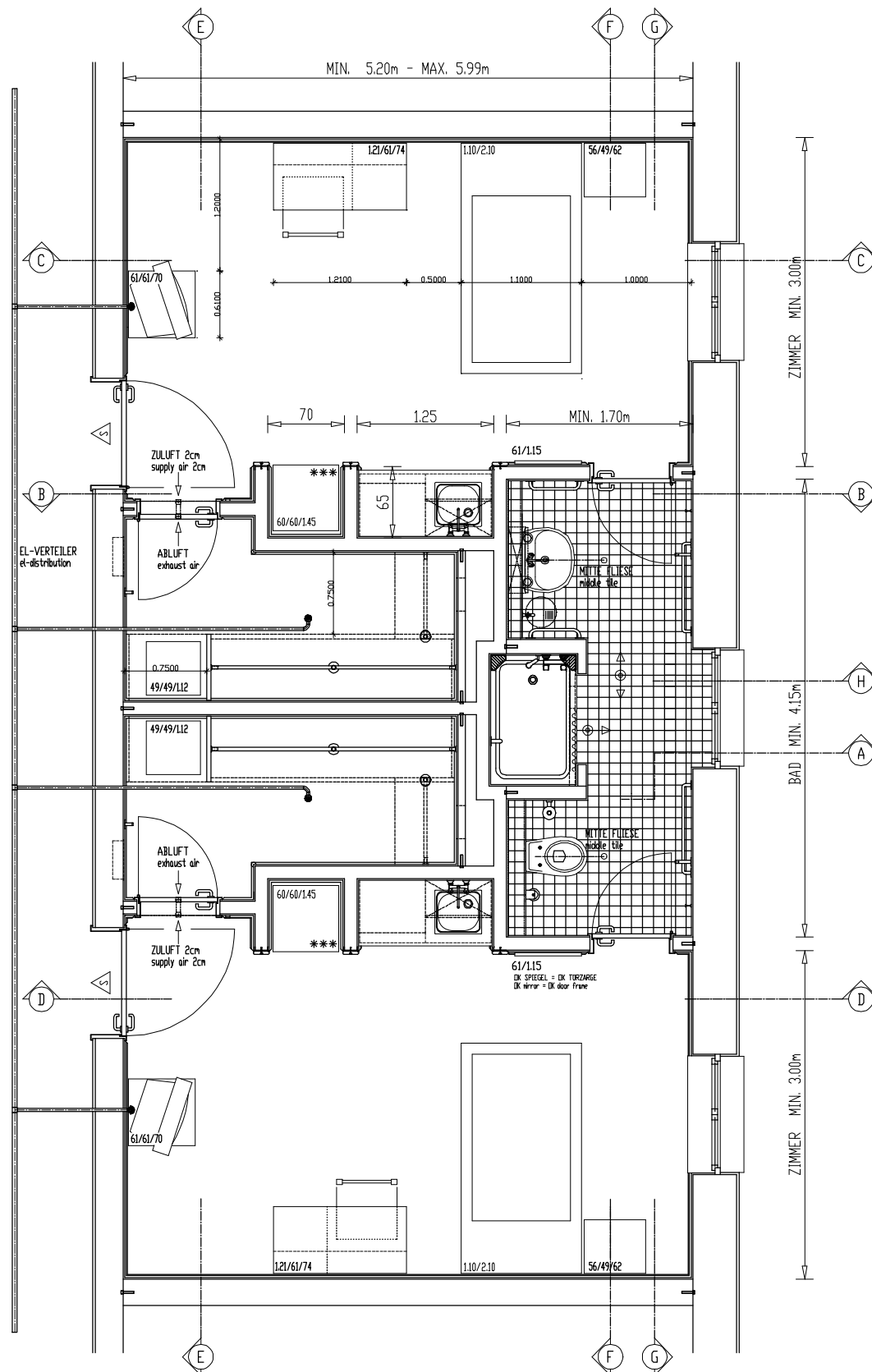
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Fig. 13.1.9 – 2 Example layout type 2



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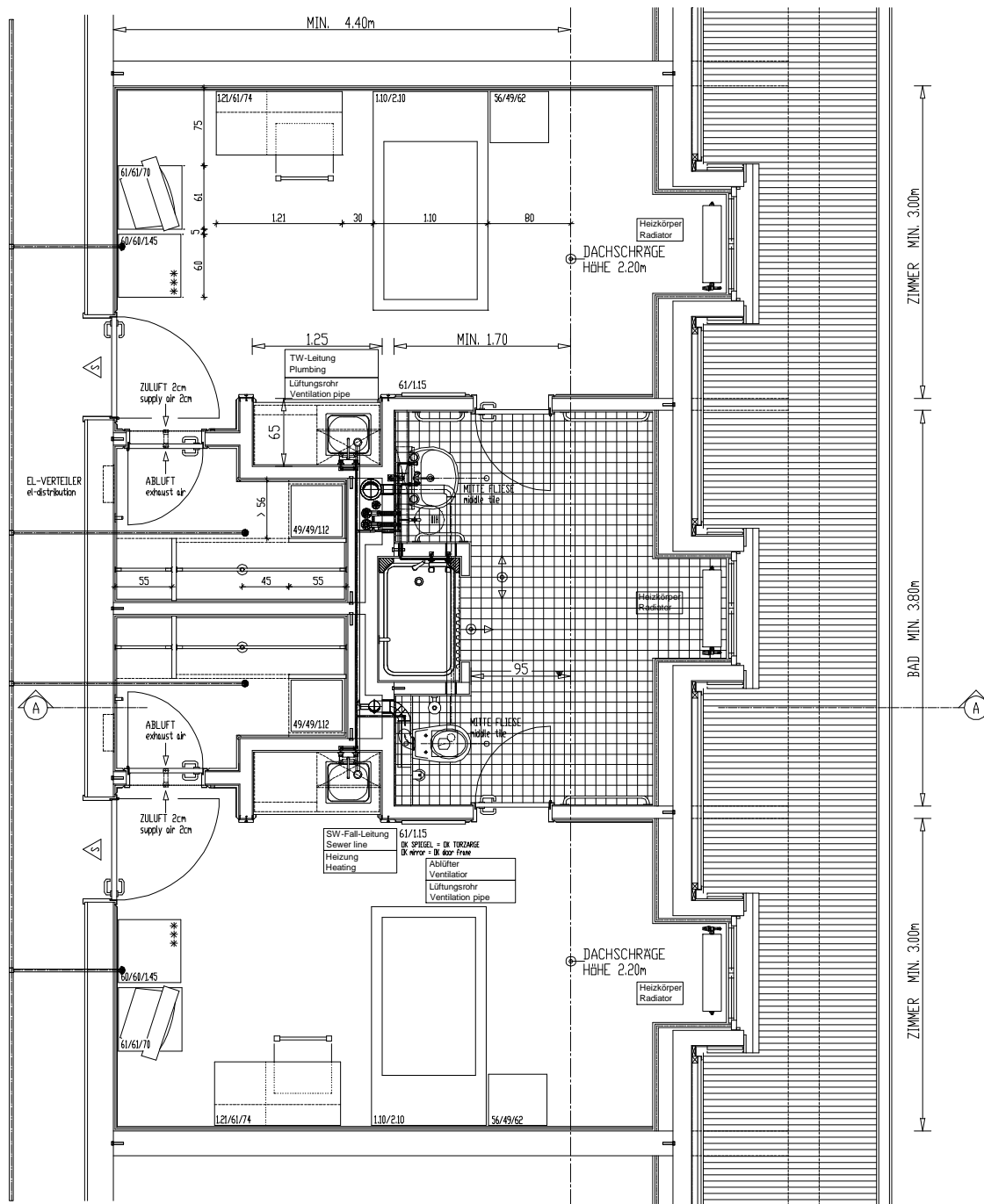
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Fig. 13.1.9 – 4 Example layout type 4



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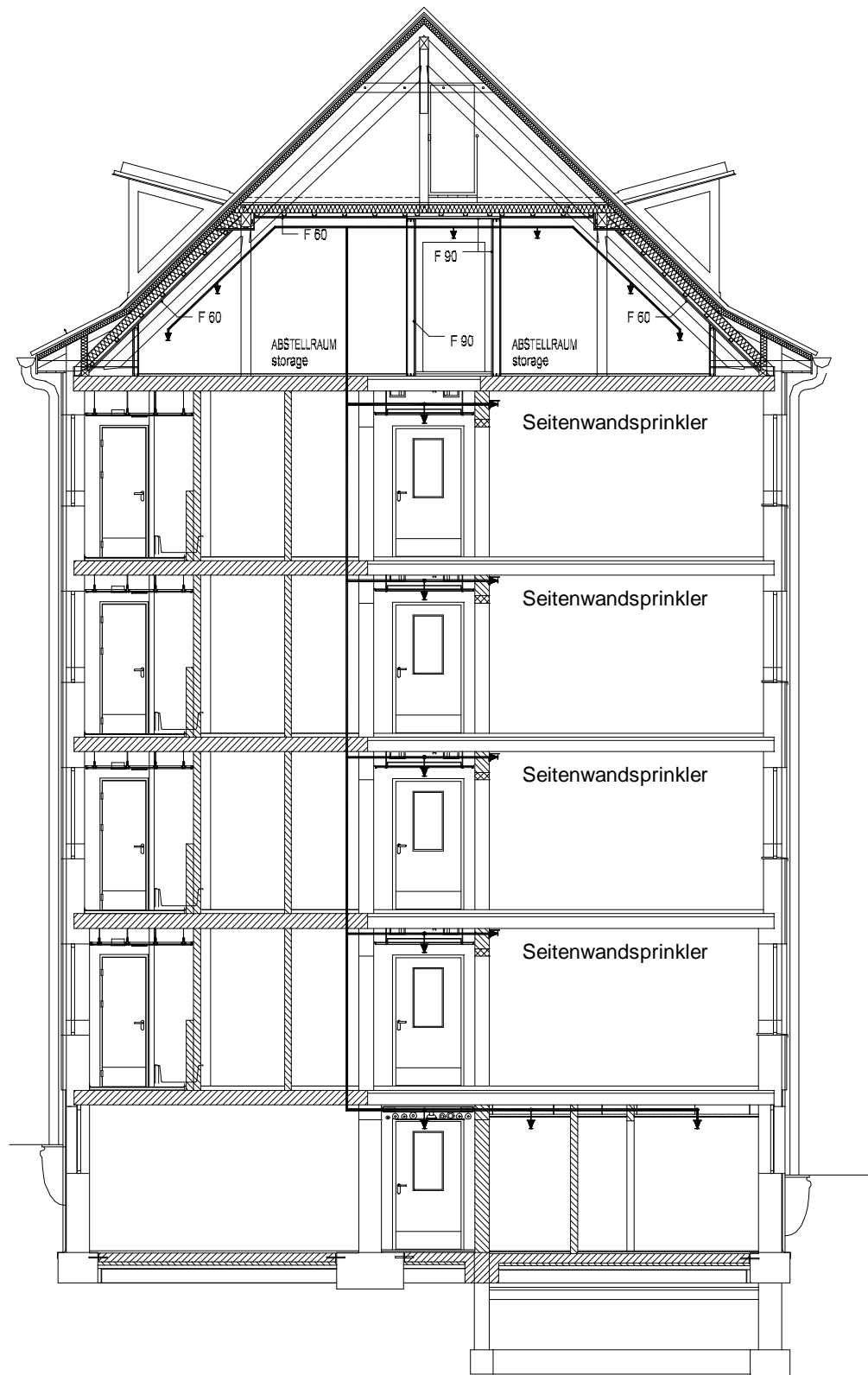
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Fig. 13.1.9 – 6 Principle sketch line guide



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		SORCE	
B 13.1.10	Sprinkler		B 01
B 13.1.10.1	Sprinkler		
Living spaces shall be protected by listed living space sprinklers. Quick responding sprinklers in vertical and/or suspended construction shall be used in all other areas provided with sprinklers.			B 02
Sprinklers in closet rooms, mud room shall be delivered with protective basket.			B 03
B 13.1.10.2	Areas to be Provided with Sprinklers		
All areas will be provided with sprinklers except:			B 04
No sprinklers in:			
1. Attic spaces, floor and ceiling areas as well as other covered areas which will not be used for storage purposes.			B 05
2. Open staircases outside of building			
3. Arms room			
4. Bathrooms			B 06
Possible provision of sprinklers:			
All bedrooms	side wall sprinklers		
Office / storage	ceiling sprinklers		
Corridors, staircases	side wall / ceiling sprinklers		B 07
Laundry	ceiling sprinklers		
Game room	ceiling sprinklers		
Mechanical rooms	side wall sprinklers		
Storage bin rooms in attic	ceiling sprinklers per storage bin room		B 08
One sprinkler shall be installed per latrine cabin in the latrines female/male basement and attic.			B 09
B 13.1.11	Calculation of Water Flow		
B 13.1.11.1	Hazard Groups / Flow Rates		
Following flow rates must be expected for areas to be dimensioned acc. to NFPA 13.		NFPA 13	B 10
The sprinklers shall be occupied with various flow rates acc. to hazard groups of areas.			B 11
The hazard groups correspond to following flow rates:			B 12
Hazard group	Flow rate		
Light Hazard	4.07 l/min/m ²		
Ordinary Hazard Group 1	6.11 l/min/m ²		
Ordinary Hazard Group 2	8.15 l/min/m ²		B 13
Extra Hazard Group 1	12.22 l/min/m ²		
Extra Hazard Group 2	16.29 l/min/m ²		B 14
			B 15

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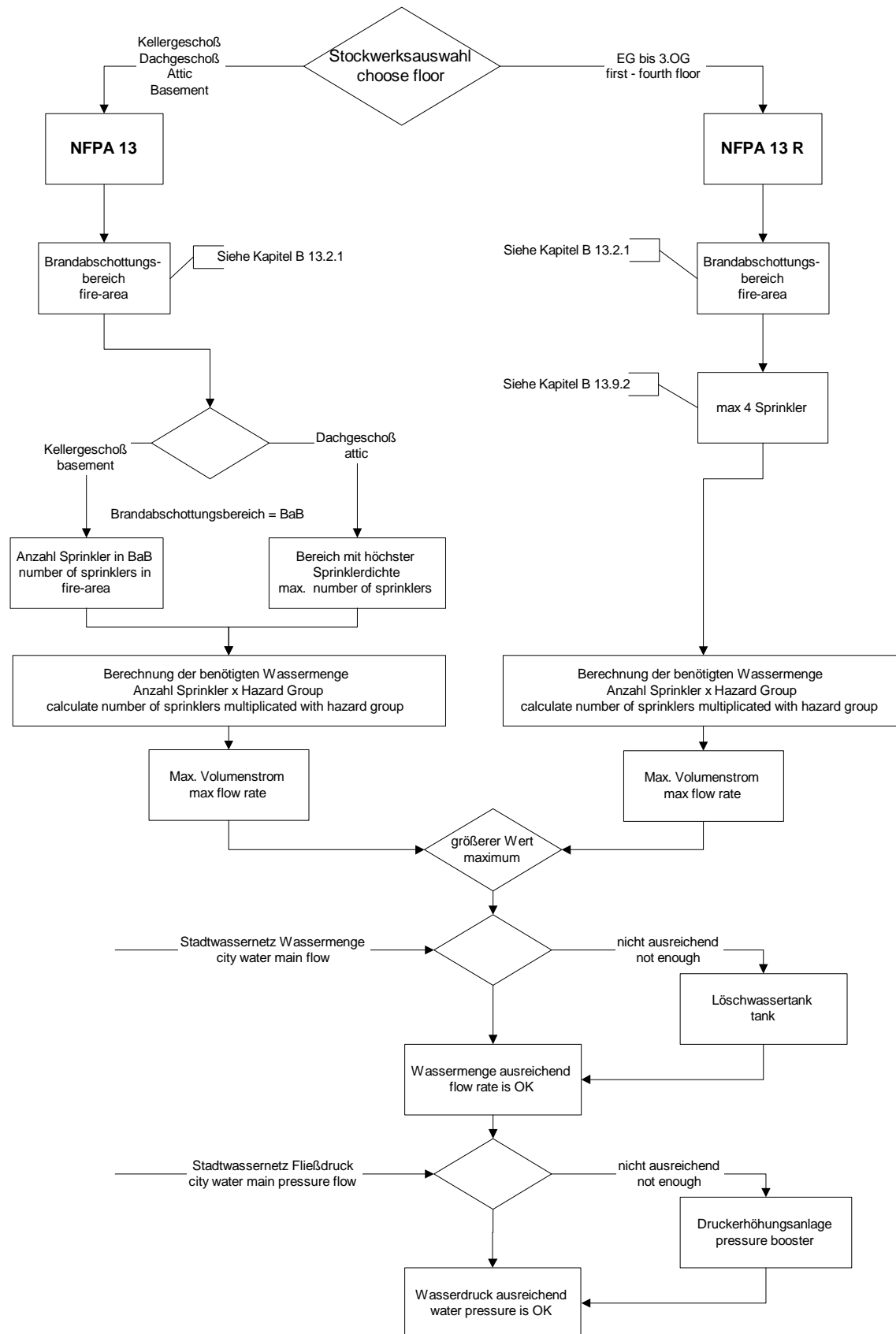
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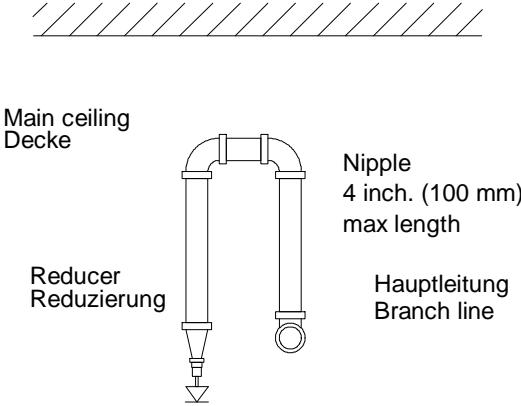
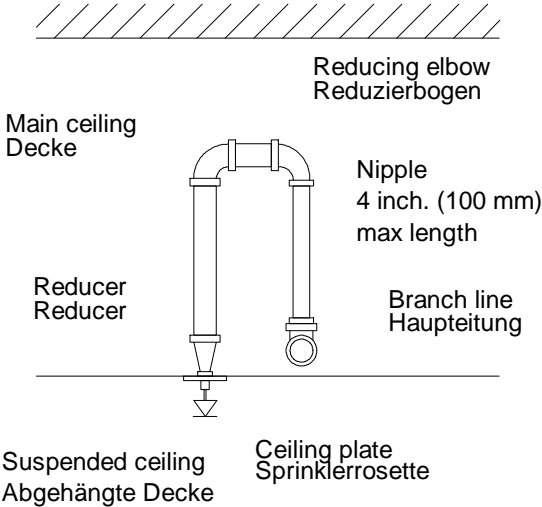
			SORCE	
Classification of hazard groups				B 01
Area	Hazard Group	Remark		
Mechanical central stations	Light Hazard			
Mechanical central stations	Ordinary Hazard Group 2	at gas operated boilers		B 02
Laundries	Ordinary Hazard Group 1			
B 13.1.11.2 Areas acc. to NFPA 13R				B 03
The water flow is calculated for the area acc. to NFPA 13R as follows:				
The entire water flow is resulting of the total of maximum sprinklers (at least 4 ea) being in operation at the same time multiplied with the flow rate of sprinklers.				B 04
B 13.1.11.3 Effective Area				B 05
The effective area for the calculation of sprinklers effective at the same time corresponds to the fire separation area.				
Max. 4 sprinklers are in operation at the same time per fire separation area.				B 06
B 13.1.11.3.4 Flow Rate Per Sprinkler				
If only one sprinkler is installed in fire separation area, the flow rate of individual sprinkler amounts to 69 l/min.				B 07
If several sprinklers are in one fire separation area, the sprinklers shall be calculated with a flow rate of 49 l/min per sprinkler.				B 08
B 13.1.11.3.5 Calculation of Water Flow				
The water flow at above listed constructions is calculated by the sprinkler system in areas to be protected acc. to NFPA 13R as follows:				B 09
V_s	=	max. water flow		
$? SP_{MAX}$	=	number of max. sprinklers being in operation at the same time (max. 4 ea)		B 10
V_{SP}	=	flow rate of sprinkler		
$V_S = ? SP_{MAX} * V_{SP}$				B 11
B 13.1.12 Calculation Course				B 12
Fig. 13.1.12 shows the calculation course for determination of required water quantity and supply pressure at the building entrance.				B 13
				B 14
				B 15

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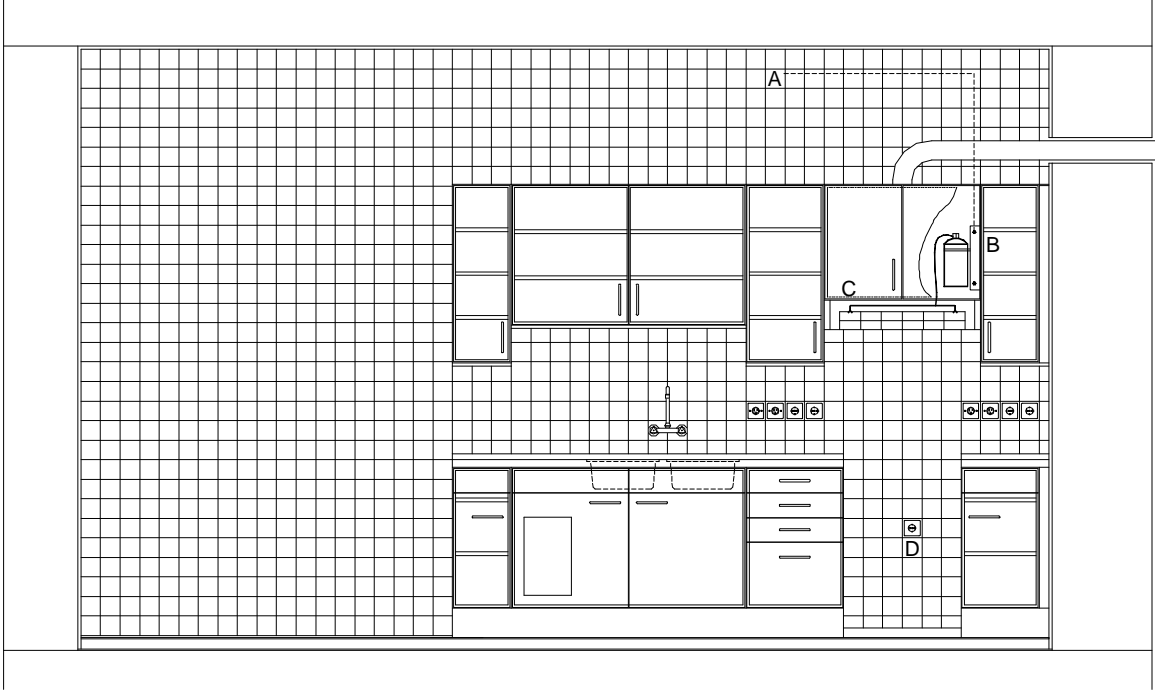
Fig. 13.1.12 Calculation course sprinkler system



SORCE		
<div><div><div>B 13.1.13</div><div>Sprinkler Connection Details</div></div><div>Following sprinkler connection details shall be observed.</div><div><div>Fig. 13.1.13 – 1</div><div>Connection detail sprinkler</div></div><div></div><div><div>Fig. 13.1.13 – 2</div><div>Connection detail sprinkler</div></div><div></div></div>		<div>B 01</div> <div>B 02</div> <div>B 03</div> <div>B 04</div> <div>B 05</div> <div>B 06</div> <div>B 07</div> <div>B 08</div> <div>B 09</div> <div>B 10</div> <div>B 11</div> <div>B 12</div> <div>B 13</div> <div>B 14</div> <div>B 15</div>

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		SORCE	
<p>B 13.2 Extinguishing Facility Kitchen</p> <p>An extinguishing facility shall be installed in the vapor hood additionally to the sprinkler system.</p> <p>The extinguishing system to be installed shall extinguish a fire on the cooking stations of a kitchen range acc. to regulations of Underwriter Laboratories, NFPA, USAF and DOD.</p> <p>The pressure container will be installed in the top cabinet of vapor hood.</p> <p>The extinguishing facility shall automatically turn-off the allocated range as well as announce the release to the fire alarm central station. See chapter B 14.</p> <p>Spray nozzles shall be used which will also protect the hood plenum.</p> <p>A manual release shall not be provided.</p> <p>Extinguishing system Guardian 21 CENT</p> <p>A system approval shall exist for the extinguishing facility and it shall be listed.</p> <p>System approval UL-approval number EX 3940.</p> <p>Make Total Walter</p> <p>Fig. 13.2 System representation extinguishing system range</p>  <p>A Message to fire alarm central station</p> <p>B Extinguishing tank</p> <p>C Piping with nozzles and release</p> <p>D Range cutoff</p>			B 01
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			B 03
		B 14.2.4.3	B 04
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	SORCE	B 01
B 13.3 Dry Pipes acc. to DIN 14461-2 Dry pipes acc. to DIN 14461 serve exclusively the Fire Department for extinguishing water conveyance and extinguishing water transportation within the building.		B 02
Further notes to installation of dry lines see section B 04. All buildings will be provided with a dry pipe.	B 04	B 03
Connection of stairwells The dry lines of the individual stairwells shall be connected among each other. T-pieces shall be installed on top floor and connected with each other on top of suspended ceiling of top floor. If no space exists above the suspended ceiling, the connection lines shall be installed in upper attic. The riser lines shall be led through the ceiling and equipped with a ventilator. A sewer connection shall be provided.	NFPA 14	B 04
B 13.3.1 Water flow and Pressures The water flow at the top tapping point shall be min. 300l/min (flow pressure). The entire system (incl. aerator and ventilator) shall be dimensioned to PN 16.	DIN 14461	B 05
B 13.3.2 Extinguishing water feeding Feeding fittings in coordination with the responsible Fire Department shall be arranged at the exterior side of building. Usually, feeding fittings acc. to DIN 14461-2 will be used. The installation height is 800 mm ± 200 mm above top edge terrain. The enameling of cabinets shall be coordinated with the local Fire Department.	DIN 14461	B 06
B 13.3.3 Extinguishing water tapping An extinguishing water tapping point acc. to DIN 14461-2 with tapping fitting DIN 14461-5 shall be installed on each floor in the staircase corridor. No tapping points are installed in basement. A drainage possibility shall be created in basement. A floor drain directly below the drainage possibility shall not be provided. The tapping points shall be installed flush mounted.	DIN 14461	B 07
B 13.3.4 Materials and Installation Parts		B 08
Pipe Material Threaded pipe acc. to DIN 2440 will be used as pipe material. Plastic pipes are not acceptable.	DIN 2440	B 09
Pipe Aerator and Ventilator Aerators and ventilators DN 50 PN 16 with up to 1400 l/min ventilation capacity shall be installed.		B 10
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B 13.4 Hydrants in Exterior Area

Hydrants shall be listed. See chapter B 13.1.2.

B 13.4.1 Accepted Hydrants

Hydrants shall be renovated in the scope of project.

B 13.4.2 Accomplishment of Hydrants

The exact accomplishment of hydrants shall be coordinated with the responsible Fire Department. Usually, hydrants with drop jacket and rated break point shall be installed.

The connection to hydrants shall be accomplished in coordination with responsible Fire Department. Usually, the hydrants are equipped with 2 B-connections acc. to DIN 14318.

The connection values of hydrants shall be 150 mm.

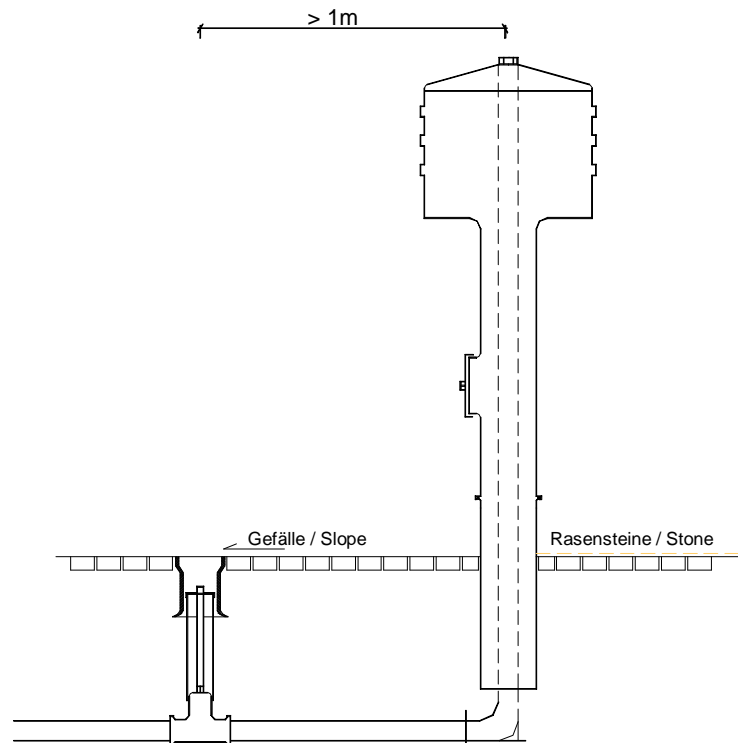
B 13.4.3 Water Supply

A shut-off device shall be installed in front of hydrant.

The distance between center shut-off valve and center hydrant shall not be below 1 m.

See also Fig. 13.16.

Fig. 13.4 Connection above ground hydrant



Stagnant water shall be avoided.

SORCE

B 13.1.2

DIN 14381

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<p>B 13.4.4 Location of Hydrants The terrain around the hydrant shall be accomplished in such a manner that surface water flows away from hydrant.</p> <p>Hydrants shall not be installed closer than 1 m to road edge and not more distant than 2 m from road edge away.</p> <p>Hydrants at parking areas shall be provided with drive protection.</p> <p>B 13.4.5 Quantity of Hydrants Hydrants shall be installed in sufficient quantity so that the required extinguishing water requirement can be covered without tapping more than 4700 l/min water per single hydrant.</p> <p>Furthermore, the required hose lengths shall not exceed 110 m.</p>	B 01
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